

We claim:

Sub B1
5 1. A process for copolymerizing ethylene or propylene together or with other olefinically unsaturated compounds, which comprises carrying out the polymerization in the presence of a catalyst system which comprises the following components:

10 A) a complex of a transition metal with one or two substituted or unsubstituted 1,3,5-triazacyclohexane ligands or corresponding ligands in which one or more of the ring nitrogen atoms are replaced by phosphorus or arsenic atoms, and

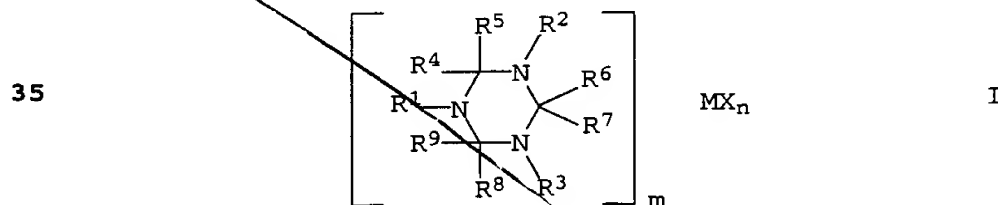
15 B) if desired one or more activator compounds.

20 2. A process for copolymerizing ethylene or propylene together or with other olefinically unsaturated compounds at temperatures from 20 to 300°C under pressures from 5 to 4000 bar, which comprises the following steps:

25 a) contacting a complex of a transition metal with one or two substituted or unsubstituted 1,3,5-triazacyclohexane ligands (A) with at least one activator compound (B),

b) contacting the reaction product from step (a) with the olefinically unsaturated compounds under polymerization conditions.

30 3. A process as claimed in claim 1 or 2, wherein a compound of the formula I



40 in which the variables have the following meanings:

M a transition metal of groups 4 to 12 of the periodic table,

45 R¹-R⁹ hydrogen or organosilicon or -carbon substituents with 1 to 30 C atoms, it being possible for two geminal or vicinal R¹ to R⁹ radicals also to be connected to form a

- 5 five- or six-membered ring, and it being possible, when
m is 2, for an R¹-R⁹ radical of in each case one
triazacyclohexane ring to form together with a
substituent on the other triazacyclohexane ring a
bridge between the two rings,
- 10 X fluorine, chlorine, bromine, iodine, hydrogen,
C₁-C₁₀-alkyl, C₆-C₁₅-aryl or alkylaryl with 1 to 10 C
atoms in the alkyl radical and 6 to 20 C atoms in the
aryl radical, trifluoroacetate, BF₄⁻, PF₆⁻, or bulky
noncoordinating anions,
- m 1 or 2,
- 15 n a number from 1 to 4 which corresponds to the oxidation
state of the transition metal M
- is employed as component (A).
- 20 4. A process as claimed in any of claims 1 to 3, wherein M is a
transition metal of group 6 of the periodic table.
5. A process as claimed in any of claims 1 to 4, wherein
mixtures of ethylene with C₃-C₈- α -olefins are employed as
25 monomers.
6. A process as claimed in any of claims 1 to 5, wherein an
aluminoxane is employed as activator compound (B).
- 30 7. A process as claimed in any of claims 1 to 5, wherein a
borane or borate having at least 2 substituted aryl radicals
is employed as activator compound (B).
8. A process as claimed in any of claims 3 to 7, wherein at
35 least one of the radicals R¹, R² and R³ is different from the
other radicals in this group.
9. A catalyst for polymerizing olefins, comprising at least one
transition metal complex (A) as defined in claims 1 to 4, or
40 8 and a support material and, if desired, one or more
activator compounds (B).
10. A process for polymerizing or copolymerizing olefins wherein
the polymerization or copolymerization is carried out in the
45 presence of a catalyst as claimed in claim 9.

Sub B3
11. A transition metal complex of the formula I as defined in claim 3, wherein at least one of the radicals R^1 , R^2 and R^3 is different from the other radicals in this group.

5 12. A transition metal complex of the formula I as defined in claim 3, wherein m is 2 and one radical R^1 - R^9 of one triazacyclohexane ring together with one of these substituents of the other triazacyclohexane ring forms a bridge between the two rings.

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13. The use of a complex of a transition metal as defined in any of claims 1 to 4, 11 or 12 in the copolymerization of ethylene or propylene together or with other olefinically unsaturated compounds.

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